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half of our century. The author devotes two chapters to Prussia's political restoration during the wars against Napoleon I., and to the political reaction that set in in consequence of it. Hegel came partly as a completion of the reaction, partly as a hope for the liberal elements inaugurating the era of "Young Germany," whose leaders were Börne, Heine, Laube, and others. Next, we find Hengstenberg pitted against Strauss, a revival of orthodoxy and of an emboldened liberalism; this is the age which made it possible for a Feuerbach to teach his most radical views of religion from the philosophical chair of a German university. The reaction following after the revolution of 1848 swept all liberalism away, and culminated in the supremacy of such men as Stahl, ending in pessimism and finally finding an expression in the acceptance of Schopenhauer's philosophy. Then the cry was heard "Back to Kant," as if all these decades of philosophical evolution had been in vain.

Our author says little about German philosophy after the restoration of the empire, and devotes the last chapters (which treat of the time from 1871 up to the present year) to the socialistic movements of our age, the culture-combat between the empire and the Roman Church, the aspirations of socialism and the social democracy, and the various symptoms of decadence as seen in anti-Semitism, the agrarian movement, the philosophy of individualism as represented by Nietzsche and Stirner, anarchism, etc., winding up with an appreciation of the poetry of the present as it finds expression in Sudermann and Gerhart Hauptmann. Although there is reason enough in the present conditions of German thought to turn pessimist, Professor Ziegler confesses belonging to the optimists, and hopes that the German nation will work its way to freedom through all its political and religious aberrations. In this sense he congratulates the German nation on the great hopes with which it is now entering upon the twentieth century.

Thirteen well executed portraits, among them Goethe, Schleiermacher, Hegel, Strauss, Robert Mayer, Bismarck, Lassalle, Marx, and Nietzsche, form a welcome embellishment to the book; the paper is good and the print is clear. That the book has an index is very recommendable, the more so as this is quite an exception in German works.

KPS.

A HISTORY OF PHYSICS IN ITS ELEMENTARY BRANCHES INCLUDING THE EVOLUTION OF PHYSICAL LABORATORIES. By *Florian Cajori, Ph. D.*, Professor of Physics in Colorado College. New York: The Macmillan Company. London: Macmillan & Company, Ltd. 1899. Pages, viii, 322. Price, \$1.60.

Dr. Florian Cajori has followed up his *History of Mathematics* with a *History of Elementary Physics*. The success of the *History of Mathematics*, which despite its high price and the necessarily limited circulation of such books has been a considerable one, is ample evidence of the appreciation which now generally obtains of the value of historical instruction in science. As in his *History of Math-*

ematics, so here Professor Cajori has interwoven a goodly amount of attractive biographical material into his expositions, which have not suffered thereby. The treatment of each subject is in periods and by centuries. The human interest of the book might have been even more enhanced, had Professor Cajori made use of a greater number of such illustrations as he has put into the first part of his book, and which exist in great profusion in physical literature—illustrations of the character of those used by Dahlmann in his German book of extracts from the great masterpieces of science (Engelmann, Leipsic). But the addition would probably have increased the bulk of the book beyond the author's and publishers' desire.

The chapter on the "Evolution of Physical Laboratories" is good. It is little known that the main great discoveries of physics, until very recently, were made in private homes entirely at private expense. "We know that Dulong expended 'nearly all his wealth on apparatus. Fresnel conducted his immortal experiments 'privately, and defrayed from his own resources the heavy expense for apparatus. 'Foucault carried on most of his experiments at his own residence. On one occasion savants flocked to the humble abode of Ampère in the Rue Fossés Saint Victor to see a platinum wire, as soon as it was traversed by an electric current, 'set itself across the meridian.

"Bernard, that prince of experimenters, worked in a damp, small cellar, one 'of those wretched Parisian substitutes for a laboratory which he has called 'the 'tomb of scientific investigators.' Gay-Lussac's laboratory was on the ground 'floor and, to protect himself from the dampness, he wore wooden shoes." Now we have such magnificent temples of science as the great laboratory at Zürich, which cost three million francs.

The wealth of enlightenment and inspiration, too, that lies in the contemplation of the history of the great discoveries, furnishing arguments and illustrations quite applicable to the conditions to-day in other fields, may be seen from the following anecdote from Galileo's career. It was just after Galileo's discovery of the sun-spots. "His observations seemed to confirm the Copernican theory. The "cloud of opposition to Galileo began to gather. Some refused to believe their "eyes, and asserted that, while the telescope answered well enough for terrestrial "objects, it was false and illusory when pointed at celestial bodies. Others refused "to look through it. Among the latter was a university professor. Galileo wrote "to Kepler: 'Oh, my dear Kepler, how I wish that we could have one hearty "laugh together! Here, at Padua, is the principal professor of philosophy, whom "I have repeatedly and urgently requested to look at the moon and planets through "my glass, which he pertinaciously refuses to do. Why are you not here? What "shouts of laughter we should have at this glorious folly! And to hear the pro- "fessor of philosophy at Pisa laboring before the Grand Duke with logical argu- "ments, as if with magical incantations to charm the new planets out of the sky.' "The antagonism to Galileo and his hated telescope became stronger. The clergy "began to denounce him and his methods. Father Caccini became known as a

"punster by preaching a sermon from the text, 'Ye men of Galilee, why stand ye "gazing up into heaven?"'"

Upon the whole, Dr. Cajori has produced a book that was needed, and as a handy manual of reference for the main historical facts of physics it will discharge a distinct service in our academic and high-school libraries as well as in the hands of individual students who have not access to foreign literature. иқққ.

TRAITÉ ÉLÉMENTAIRE DE MÉCANIQUE CHIMIQUE FONDÉ SUR LA THERMODYNAMIQUE.

By *P. Duhem*, Professeur de physique théorique a l'université de Bordeaux.

Tome IV. Les Mélanges doubles. Statique chimique générale des systèmes hétérogènes. Paris: A. Hermann. 1899. Pages, 381.

Duhem's *Treatise on Physical Chemistry* is well known to the readers of *The Monist* through three previous reviews, and the reputation of the work is such that but brief reference is necessary to the contents of the present fourth and last volume. It is divided into two books treating of double mixtures and the general chemical statics of heterogeneous systems. In the first of these books the theory of distillation, the critical stages of mixtures, the liquefaction of gaseous mixtures, etc., are treated; in the second book the general principles of the chemical statics of heterogeneous systems under constant pressure, the general theorems relating to univariance and bivariance, and the general principles of the statical chemics of heterogeneous systems at constant volume, are given. The work contains an index of authors and of the chemical substances studied in the four volumes constituting it, and a glance at this index will show the scope and completeness of this first systematic work on mathematical chemistry.

LEÇONS NOUVELLES SUR LES APPLICATIONS GÉOMÉTRIQUES DU CALCUL DIFFÉRENTIEL.

By *W. de Tannenberg*, Professeur a la Faculté des Sciences de l'Université de Bordeaux. Paris: A. Hermann. 1899. Pages, 192.

The present volume is another indication of the activity prevailing at the University of Bordeaux in the department of science. The book is not a large one, but it expounds the chief methods of applying the Differential Calculus to geometry, from clear and partly novel points of view. It is divided into five parts, treating of the descriptive properties of lines, the descriptive properties of surfaces, the metrical properties of lines, the metrical properties of ruled surfaces, and the metrical properties of curved surfaces, respectively. The typography of the book is pleasing, and in the same style as the other mathematical books of Hermann.

DE L'INFLUENCE DE LA PRESSION SUR LES ACTIONS CHIMIQUES. By *Georges Aime* (1837). Avec une introduction par *P. Duhem*. Paris: A. Hermann. 1899. Pages, 32.

The above title is that of a thesis for the doctorate, written in 1837 by *Georges Aimé*, of Metz. It has been deemed worthy of reprinting by the Scientific Society

of Bordeaux, and has been supplied with an introduction by Professor Duhem, who regards it as an extremely important document in the history of science, in that it shows for the first time that the "tension of dissociation" has the same value in an inert gas as in a vacuum, and is thus a justification of the postulate upon which the theory of Gibbs rests. Sainte-Claire Deville, who was the first to have promulgated the "theory of tension of dissociation" (1863), was ignorant of the results of Aimé.

LECONS DE CHIMIE PHYSIQUE PROFESSÉES A L'UNIVERSITÉ DE BERLIN. By *J. H. Van't Hoff*. Traduit de l'Allemand par *M. Corvisy*, Professeur agrégé au Lycée de Saint-Omer. Deuxième partie. La statique chimique. Paris: A. Hermann. 1899. Pages, 162.

"Chemical Statics" is the subject of the second part of Van't Hoff's work on physical chemistry. It is made up of lectures delivered in Berlin during the academic year of 1897 to 1898, and forms the second installment of a large, comprehensive work on physical chemistry. But it may be considered as an independent work, treating of the methods to which we owe the knowledge we now possess regarding the size, structure and grouping of molecules, and from which has sprung the modern scientific conception of the constitution of matter. The theory of solutions and stereo-chemistry have received adequate consideration. The present second part of Van't Hoff's work has not yet been translated into English, and M. Corvisy's French translation may in the meantime be of considerable service to readers not acquainted with German.

INSTINCT AND REASON. An Essay Concerning the Relation of Instinct to Reason, with some Special Study of the Nature of Religion. By *Henry Rutgers Marshall, M. A.* New York: The Macmillan Co. 1898. Pages, xiii, 574. Price, \$3.50.

The main subject of the present work is the study of religion. The study of instinct and reason forms merely a condition precedent to a comprehension of the religious problem proper. "It has long seemed to me evident," says the author, "that activities which are so universal in man as are those which express our religious life, cannot fail to be of significance in relation to our biological development, especially as these activities have persisted for so many ages in the human race. I have, therefore, attempted to outline a theory which will account for the existence of religious activities, and which will explain their biological import."

It will be unnecessary for us to follow Mr. Marshall into the intricacies of the psychological development upon which he has based his theory, except to say that instinct appears to him "as a mode of that simplest of all phenomena of activity—the reaction of a living cell to the stimulus from its environment." Instinct con-